

WHAT IS CLAIMED IS:

1. A method for rendering a digital image having surface reflectance properties, said method comprising the steps of:

creating a parametric texture map that comprises parameters for an equation that defines a surface structure in a manner in which the appearance of the surface structure

5 includes surface reflectance properties; and

rendering a digital image using said parametric texture map.

2. The method of claim 1 wherein said creating step further comprises:

creating said parametric texture map such that it models a surface reflectance function defining said surface reflectance properties of said surface structure.

3. The method of claim 1 wherein said surface reflectance properties vary in response to a light direction vector and a view direction vector.

4. The method of claim 1 wherein said parametric texture map comprises at least four independent variables.

5. The method of claim 1 wherein said parametric texture map comprises at least two independent variables for defining a light direction vector for said surface reflectance properties.

6. The method of claim 1 wherein said parametric texture map comprises at least two independent variables for defining a view direction vector for said surface reflectance properties.

7. The method of claim 1 wherein said parametric texture map comprises a plurality of texels and wherein said parametric texture map further comprises a plurality of coefficients for each texel, said plurality of coefficients defining lighting characteristics for varying views of the respective texel.

8. The method of claim 1 wherein said parametric texture map comprises at least two independent variables for defining a half-angle vector for said surface reflectance properties.

9. The method of claim 1 wherein said parametric texture map comprises at least two independent variables for defining a difference vector for said surface reflectance properties.

10. The method of claim 1 wherein said equation models a Bidirectional Reflectance Distribution Function (BRDF).

11. A method for creating a parametric texture map for modeling surface reflectance properties for use in rendering a digital image having said surface reflectance properties, said method comprising the steps of:

for each texel of a texture, sampling surface reflectance data and determining at least one coefficient of said parametric texture map based at least in part on the sampled surface reflectance data.

12. The method of claim 11 wherein said determining step comprises:
determining six coefficients of said parametric texture map based at least in part on the sampled surface reflectance data.

13. The method of claim 11 wherein said parametric texture map comprises at least four independent variables.

14. The method of claim 11 wherein said parametric texture map comprises at least two independent variables for defining a light direction vector for said surface reflectance properties.

15. The method of claim 11 wherein said parametric texture map comprises at least two independent variables for defining a view direction vector for said surface reflectance properties.

16. The method of claim 11 wherein said parametric texture map comprises at least two independent variables for defining a half-angle vector for said surface reflectance properties.

17. The method of claim 11 wherein said parametric texture map comprises at least two independent variables for defining a difference vector for said surface reflectance properties.

18. The method of claim 11 wherein said step of determining further comprises: performing a least squares fit algorithm to the sampled surface reflectance data.

19. A computer graphics system including a graphics processor and display, the system comprising:

a parametric texture map executable by said graphics processor, wherein said parametric texture map models a surface reflectance function defining surface reflectance properties for a surface structure.

20. The system of claim 19, wherein said parametric texture map comprises four independent variables.

21. The system of claim 20, wherein said parametric texture map comprises at least two independent variables for defining a light direction vector for said surface reflectance function.

22. The system of claim 19 wherein said parametric texture map comprises at least two independent variables for defining a view direction vector for said surface reflectance function.

23. The system of claim 19 wherein said parametric texture map comprises at least two independent variables for defining a half-angle vector for said surface reflectance function.

24. The system of claim 19 wherein said parametric texture map comprises at least two independent variables for defining a difference vector for said surface reflectance function.

25. The system of claim 19 wherein said parametric texture map is executable by said graphics processor to render said surface structure having surface reflectance properties defined by said surface reflectance function in substantially real-time.

26. The system of claim 19 wherein said surface reflectance function comprises a Bidirectional Reflectance Distribution Function (BRDF).

27. A system for rendering a digital image utilizing a texture map, said system comprising:

a texture map data structure representing a texture map of a plurality of texels, said texture map data structure comprises at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector.

28. The system of claim 27 wherein said texture map data structure models a surface reflectance function for a surface structure.

29. The system of claim 27 wherein said texture map data structure further comprises a plurality of coefficients for each texel of said texture map, said plurality of coefficients defining lighting characteristics for varying views of each respective texel.

30. The system of claim 27 further comprising:
a rendering algorithm, said rendering algorithm being operable to calculate texel display value using said texture map data structure.

31. The system of claim 30 wherein said rendering algorithm is operable to render a 3D object having surface reflectance properties as defined by said texture map data structure.

32. A system for rendering a digital image utilizing a texture map, said system comprising:

a texture map data structure representing a texture map of a plurality of texels, said texture map data structure comprising at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector.

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33. The system of claim 32 wherein said texture map data structure models a surface reflectance function for a surface structure.

34. The system of claim 32 further comprising:
a rendering algorithm, said rendering algorithm being operable to calculate texel display value using said texture map data structure.

35. The system of claim 34 wherein said rendering algorithm is operable to render a 3D object having surface reflectance properties as defined by said texture map data structure.

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